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Chapter 2

Food Safety: Food Crisis Management

Caspar Diederich von der Crone

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Abstract

Food safety is a complex topic, and the various market participants are involved, such as authorities, non-governmental organisations (NGOs), consumer protection bodies and the media, have a very different, often emotionally charged perspective. This poses a particular challenge to producers and distributors when deciding on a method to deal with media attention on unhealthy food, with contaminations and residuals. There are numerous examples of crises caused by impermissible residuals. This shall be illustrated using concrete examples from the egg, game and poultry industries.

Keywords: basics food law, health risks, microbiological dangers, residuals, HACCP concept, standards, crisis management, preventions

1. Introduction

Food safety is paramount in the food chains with raw materials contaminations, improper treatment or storage and incorrect declarations or expiration dates having become a daily occurrence. Almost every German food company, as well as food companies in other countries, experiences at least one so-called food crisis over the course of its activities. These are often triggered by inconspicuous events that are not indicative of a threat initially. However, experience has shown that what seems like harmless negative customer feedback or complaints can give rise to a full-blown crisis. The consequences are often initiated by media warnings, which might in turn lead to product recalls. These are subsequently published by the supervisory authorities in the European Rapid Alert System for Food and Feed—RASFF [1]. This is associated with high costs and time expenditures for those parties involved. As a result, recalls can even threaten the very existence of the distributing company responsible. Moreover, the distribution of unsafe food is usually associated with significant image loss. At the same time, the question arises when food should be considered hazardous to health following the legal

intention of the general administrative regulations of the EU Rapid Alert System. The Article Food Safety and Crisis Management illustrates this using several real practical examples, which the author Caspar von der Crone has overseen as responsible manager [2] over the last years.

2. Basics of food safety

The general rule is: Food that is not safe may not be distributed. This is regulated by EU Regulation (EC) No. 178/2002 (Basic Regulation) [3]. In addition, national regulations apply as for example the German Food and Commodities Act (LFGB) [4]. In a European Law framework, food is only considered unsafe if it can be assumed that it is harmful to health. In addition, food is also considered unsafe if it can be assumed that it is not suitable for human consumption. A differentiation is in order here, as the first description is concerned with defending against health risks, while the second description only serves to secure commercial consumer interests. Put differently, consumers' commercial interests—and not their physical integrity—should be protected from bad buys and unpleasant surprises to the greatest possible extent.

The objective is a sustainable business condition along the entire process chain, as shown in **Figure 1** (overview), under the inclusion of ecological, economical and social aspects. This applies in equal measure to the entire value-added chain, under the consideration of the respective process steps, starting at the producer and ending at the consumer. The legal requirements must be included, as well as the interests and requirements of NGOs, paying particular attention to consumer's expectations, who make the decision in the end and are an important part of the process chain.

Figure 1. Food safety and dialogue between relevant groups.

3. Control scenarios

Modern food control, in other words, is the control for 'means of live' [5]. **Figure 2** is still at a nascent stage; however, its roots date back far into the past. Controls to ensure that consumer demands for healthy food were met have been in place for ages. German Food Law's history can be traced to the Middle Ages. Here, the objectives were to fight wine adulterating or counteract the growing public health risk posed by raw materials that are hazardous for health, among others. Regulations for meat production were introduced at a very early stage, with relevant hygiene directives. Regulations concerning the restructuring of food contact materials (LMBG) were introduced in the 1970s, which allowed the state to act to protect consumers against damage to health.

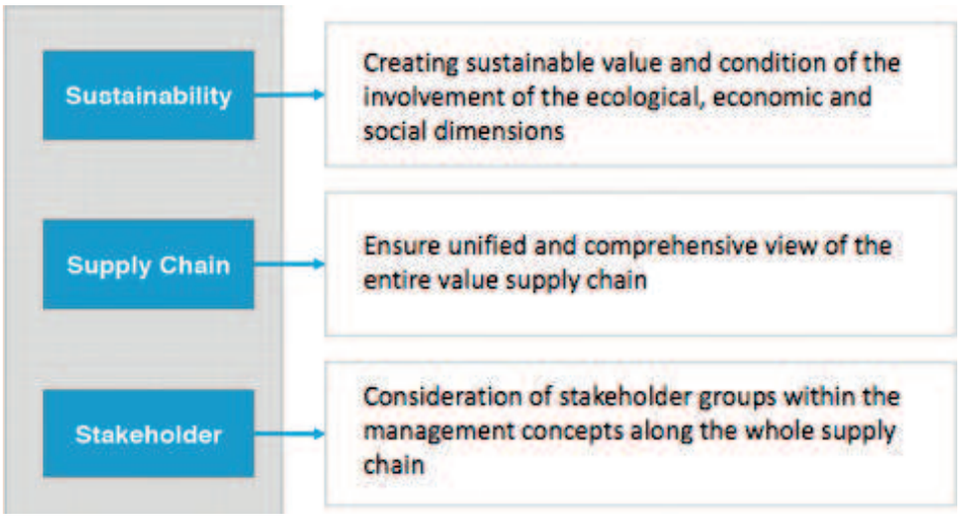

Figure 2. Transparency, sustainability and responsibility along the process chain.

The survey conducted by the European Commission in their White Paper on Food Safety from 2000 is additionally worth mentioning. In it, the Commission worked out a division of food safety responsibilities between the involved actors, with the main responsibility for food safety lying with the feed producers, the farmers and the food producing companies. In this context, the HACCP concept (Hazard Analysis and Critical Control Point) was introduced, which obligates the food company operators to danger analyses and conceptual assessments. The FAO/WHO Codex Alimentarius offers an internationally binding version, which in turn is part of the 'General Principles of Food Hygiene'. With the HACCP concept, health risks posed by food should be identified, evaluated and managed.

The HACCP consists of seven principles:

1. Conduct a hazard analysis.
2. Identify the critical control points (CCPs).
3. Establish critical limits.
4. Monitor CCPs.

5. Establish corrective action. These shall be implemented if monitoring shows that a certain CCP is no longer under control.
6. Preparing procedures to verify and confirm the successful operation of the HACCP system.
7. Recordkeeping that considers all processes and records concerning the principles and their application.

With the EU Basic Food Regulation, the European Food Safety Authority (EFSA) was established. The EFSA assumes tasks that relate to the scientific evaluation of relevant food topics at the EU level. The EFSA is also the point of contact for the scientific evaluations related to certain approval procedures, for example during the approval of food additives.

Every food producer is subject to controls along the entire process chain, starting at the farmer/producer up to the food retailer, to inspect the adherence to relevant production standards. Over the last years, many standard-setting bodies have established themselves on the market. In the area of egg production, this is the KAT System (Association for Controlled Alternative Animal Husbandry) [6]; for meat production, the QS GmbH (Quality scheme for food) [7]. Both systems cover the entire process chain with specific standards and criteria, and they are ultimately demanded by retailers for animal product distribution. The International Featured Standard (IFS) [8] is another controlling body, a standard developed by the food retailers that places very stringent process quality and traceability demands on processing companies. The IFS Standard offers additional safety guarantees. The controls take place annually, with the so-called integrity audits (unannounced inspections) offering further security. By now, producers and distributors from across the globe operate by the IFS Standard to meet globalised quality, transparency and efficiency demands. It ensures that the certified companies attain a high quality and product safety standard.

Figure 1 represents the dialogue between scientific and regulatory actors within the process chain.

Biological, chemical and physical agents, as well as insufficient allergenic property information, can all pose health hazards. Additionally, the German General Administrative Regulation for the implementation of the Rapid Alert System for Food, Food Contact Material and Feed (*AVV Schnellwarnsystem*) [9] offers a guideline for the evaluation of a food that poses a potential health hazard. However, it should be noted that the General Administrative Regulation has no legally binding qualities and solely serves to harmonise the implementation of Food Law. Put differently, the General Administrative Regulation has an internally binding effect for the Food Enforcement Authority at most.

The normal consumer usage conditions should first be considered when deciding whether a food product is safe or not. For example, this relates to improper handling, which runs counter to the principle of proper kitchen hygiene in a private residence such as improper storage of products that should be refrigerated.

The result is that hazardous food products purchased by consumers should be recalled publicly via the media, while the product that is 'only' unsuitable for human consumption will be recalled 'quietly' through the commercial buyers.

Biological, chemical and physical agents, as well as insufficient information about allergenic properties, can pose particularly significant consumer health hazards. The normal consumer usage conditions should first be considered at all levels when deciding whether a food product is safe or not. This means that those types of usage which are not normal but at the same time imaginable should also not lead to situations that might be hazardous. However, improper handling after purchasing, insufficient adherence to hygienic principles in private residences, incorrect storage of products that should be stored under refrigerated conditions, or also the consumption of raw poultry might have negative health effects and lead to illness. Even if this lies outside the distributor's scope of responsibilities, it might be hard to interpret evidence pertaining hereto.

The high incidence of salmonella in the beginning of the 1990s is a good example of this. The illness was primarily caused by the consumption of eggs or egg products (tiramisu and other dishes containing raw eggs). Even though the root cause was improper handling and failure to adhere to refrigeration guidelines, eggs were still suspected to be highly pathogenic, which subsequently led to a significant consumption reduction. German legislators reacted with national cooling regulations from the 18th day onwards. This regulation was only lifted a few years ago, when it is known that cause and effect had been mixed up. There are still salmonellae; however, consumer education through advice on egg storage after purchase, as well as consistent salmonellae monitoring at the production level, led to a greater degree of food safety. The same problems have not occurred, even though the regulation prescribing cooling from the 18th day onwards has been lifted.

This serves to illustrate that a decision on a food product's safety should also consider that information communicated to the consumer—including label information and cooking recommendations—contributes to safety. The packaging advice 'heat before consumption' is another classic example that helps avoid health hazards; this instruction points out to the consumer that the food should be treated accordingly, that is to say, not consumed raw.

This particularly applies to raw poultry meat, for the lion's share of relevant germs is killed if these products are heated at 70°C for at least 10 min. This also includes good kitchen hygiene and know-how on handling and processing food intended for immediate consumption.

4. Hazard to human health

The exact definition of a hazard to human health as it relates to regulations is not concretised or clarified further legally. However, as it concerns a hazard that is triggered by the consumption of affected food, the basics of Food Law apply at the least. Following Article 3 (14) of the Basic Regulation, a hazard is a biological, chemical or physical agent in a foodstuff, or condition of a foodstuff, that might negatively influence health.

In principle, physical, biological and chemical hazards to human health are imaginable. However, in the production of food commodities, focus is clearly placed on 'chemical components' due to the complex structures [10].

Biological dangers that originate from the commodity itself are not plausible. If finished products, such as kitchen utensils, are passed onto the consumer, there is only limited necessity due to the common household cleaning before use.

The circumstances are different for convenience food. A possible, if still unlikely, practical scenario might be the contamination of food commodities during production, for example due to an ill employee. Today, legal requirements (instruction obligations) make the risk of transmitting certain legally relevant illnesses significantly less likely and rather negligible.

Food commodities can also pose a threat through physical contamination. Foreign bodies, as well, are not that uncommon. Material fatigue and damages might lead to foreign bodies entering a food product such as metal residues because of a malfunctioning or broken metal detector.

Another example comes from game: metal residues from pellets have led to a (in part complete) ban on wild hare meat. However, this was not due to the metal residues themselves, but rather due to the fact that the pellets contained lead. Lead residues in game can pose a risk to human health from a food inspection perspective. Pellets containing lead were the standard hunting shot until recently. The German Federal Ministry of Food and Agriculture (BMEL) [11], German Federal Institute for Risk Assessment (BfR) [12] and the European Poultry, Egg and Game Association (EPEGA) [13] have assumed responsibility and performed large-scale lead-residual monitoring in killed game. The research project 'Food Safety of Killed Game' can be accessed publicly on the BMEL website.

The results did not indicate a direct health hazard with proper hunting. However, the indicated consumption was rather negligible at 0.5 kg per inhabitant. All the same, heavy game consumers (hunters), children and pregnant women were deemed at risk. The situation has led to changes as lead-containing shot is increasingly replaced by lead-free ammunition since then. This makes game a safe product again. This example shows that small effects can lead to serious issues that cast shadows over entire industries.

5. Microbiological hazards

Food hazards are most commonly caused by microbiological organisms. Generally speaking, bacteria play a vital role in food production. Useful bacteria influence food properties positively, think of aromas. Unwanted bacteria in and on food can negatively influence product quality as spoilage agents or even pose a food safety risk as pathogenic agents.

Many food products—of animal origin in particular—present an ideal culture medium for bacteria, offering optimal living and multiplication conditions. A classic example is the salmonellae in the products containing raw egg or raw poultry mentioned before. Good hygiene is essential in impeding the multiplication and spread of microorganisms. This also includes the systematic cooling of food products of animal origin, which additionally stops the spreading of germs. This makes compliance with the cooling chain another important preventative measure, just like proper heating.

The Commission Regulation (EC) No. 2073/2005 [14] on microbiological criteria for foodstuffs offers a legal foundation. This regulation contains the so-called hygiene package from 2004,

with it, the European Union renewed its food hygiene regulations. Since 2004, there has been another paradigm shift in the distribution of food product of animal origin. Another example from the commercial exploitation of game: This industry was also plagued by complaints and scandals that cast a shadow on the commercial viability of game distribution, as old traditions were followed, and the cooling chain was not immediately adhered to, or adhered to at all, after the kill. This led to microbiological values that in part far exceeded the regulated maximum values and in turn led to recalls and closures of game-processing companies. In his function as the General Manager of European Poultry, Egg and Game Association, the author of this article initiated regulations for good game hygiene, connected to a microbiological assessment. This was in the interest of the associations' member companies and served as a foundation for consumer health protection. Extensive studies of killed game under various cooling requirements and game carcase treatment after killing showed that it is well possible to adhere to the microbiological regulations. The so-called game guidelines [15], with specific provision for the handling of killed game and distribution regulations, as well as the associated consequences, have established standards that ultimately contributed to restoring consumer trust, making properly treated game considered a safe food product again.

The illustrations and explanations on food safety mentioned above merely represent a foray into Food Law. The regulations are very complex at a national and EU level and cannot be treated more comprehensively in this article. In the following discussion of food safety, further practical examples serve to illustrate the influence of crisis management and food safety.

6. Levels of responsibilities and competences

All parties involved in refining food products, at all levels, are responsible for their safety, with the primary responsibility placed on the producer. The responsibilities of producers and distributors are orientated following the principle of concrete influences within the scope of

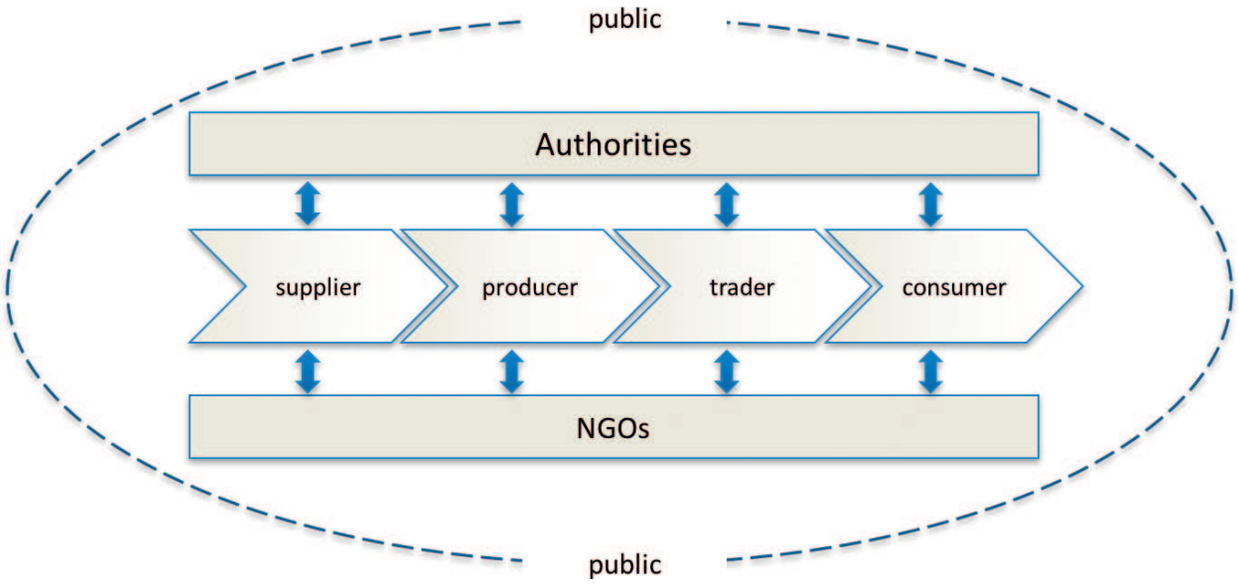

Figure 3. The process chain: Levels and participants.

activities. Additionally, the producers should, in the context of their business activities, take all measures appropriate to recognise potential hazards, befitting the properties of the products they deliver, and to take precautions against potential consumer hazards.

Figure 3 illustrates the various process levels. Here, each participant bears equal responsibility for the safety of a certain product, from production to the final customer purchase. The parties involved should assure that the condition and labelling of the product adhere to all legal requirements along the entire chain. The requirements that apply at the various process levels are provided by the government, while nongovernmental organisations significantly influence the public opinion formation process during crises. A constructive dialogue with the supply chain should take place with the relevant stakeholders.

7. Crisis management

Crisis management above all entails crisis management in collaboration with the responsible authorities. Attempts by a company to cover up or ignore an issue are particularly problematic.

The author of this article has faced numerous crises up front, providing the practical experience to manage these. In the following, practical crisis examples are used to illustrate and elucidate what measures can be used in what ways to guarantee a future-proof presentation of prevention.

Some essential perspectives on crisis management:

Customer, authority, or consumer complaints cannot be left unanswered. They are a vital source of information about the safety of a company's products. In principle, it does not matter whether a customer complains that a product expired before the indicated expiry date, or that this is documented in an officially logged complaint. In all cases, the same concrete circumstance applies, namely, that the products expired before the expiry date. This might have various causes, some of which might not be attributable to the producer (for example, an interruption of the cooling chain at the retailer).

If the food business operator fails to follow up on this complaint and fails to process this complaint in an appropriate manner, the situation might develop into an actual crisis. This rings true particularly considering the fact that authorities, after repeat comparable violations, no longer assume negligence but rather accuse the food business operator of intent.

Within a crisis management context, all procedures and work instructions relating to the handling process of complaints should be defined. An example of this is the development of forms for consumer complaints to help employees summarise complaints by phone or in writing, with an accompanying work instruction. Here, the development of a crisis plan is of the utmost importance, and this is a type of work instruction that prescribes how to act in crisis situations. This not only applies to the company itself; authorities are also obligated to develop crisis plans. This is fundamentally regulated by the Basic Regulation of the European Commission, which drafts a general crisis management strategy together with the European Food Safety Authority (EFSA) and the member states. This strategy is used if the preventive, curative, and reductive risk measures defined in the Basic Regulation do not suffice.

Another method to improve food safety lies in informing consumers, by increasing their knowledge of food and certain potential hazards related to food. Poultry offers another example. If it is cleaned in water that is subsequently used to wash lettuce leaves, this might lead to salmonellae finding their way into the food. This is why good kitchen hygiene practices are of cardinal importance. Gaps in consumer knowledge can be filled by relevant product information or by informational campaigns. This information should be written in simple language.

This goes to show that 'risk minimisation' is a very diverse topic, some practical examples are explored in the following.

8. Residues and dioxins

The so-called dioxin crisis at the end of 2011 led to an official warning about foodstuff that was not suitable for distribution. This crisis primarily affected eggs and poultry. Noteworthy about this crisis is not the circumstance that fatty acids in milk which might contain dioxins—primarily intended for technical purposes—were potentially mixed in with compound feed for animal rearing in a feed plant. The actual cause was dioxins in this feed that stored themselves in the fatty acid, leading to egg and poultry meat contamination, among other animal product contaminations, later.

Dioxins have led to significant problems in the past. The first of these was a chemical accident in Seveso, Italy, in the middle of the 1970s, with approx. 2 kg of dioxins released into the environment, leading to serious diseases. Dioxin is considered a carcinogen with significant adverse health effects, which in turn explains the fears of consumers, as well as the potential effects of dioxin residues.

The Belgian dioxin crisis took place in 1999. The improper use of frying oils in animal feed led to dioxin findings in eggs. At the time, this had catastrophic effects on egg consumption, which was virtually reduced to zero out of fear for diseases. The emotional perception played an enormous role in this, even though only relatively minor dioxin traces were found. However, the actual problem was that the egg origins could not be traced, which led to all eggs being taken off of retailers' shelves.

As a consequence, the Association for Controlled Alternative Animal Husbandry (KAT), at the time headed by Caspar von der Crone, advocated a general ban on feed with animal protein. While this might increase production costs, it would allow the industry to regain consumer trust, capable of contributing significantly to food safety.

Another case occurred in 2002, the so-called Nitrofen scandal. Nitrofen is an herbicide that had been used in the agricultural industry. It turned out later that Nitrofen is a carcinogen that is not broken down by the body but rather stored in animal fatty tissue, which can in turn be found in the eggs of laying hens. These residuals were found in the summer of 2002. Nitrofen was one of many pesticides already forbidden in the EG but still allowed in the DDR up to 1999. This led to remaining stock with contaminated feed in a storage after the German reunification, which was in turn inspected and cleaned insufficiently before being fed to laying hens as organic feed, among others.

This gave rise to another scandal, in the area of organic production, with extensive recall actions as a result. The affected companies could be identified exactly in the beginning. The database system developed by KAT at the time, striving to safeguard traceability, as well as the newly introduced identification measures for individual eggs with origin labelling, proved to be an effective preventative measure. For the first time, it was possible to recall contaminated eggs in a targeted manner, avoiding any negative effects or harm to consumers.

The affected companies suffered significant losses, even threatening their very existence, but managed to rebuild trust through consistent action-taking. There was an awareness that product traceability is one of the most important food safety criteria in crisis situations. This led to the EC decision to adopt individual egg labelling as a binding requirement for egg distributors across the EU.

The dioxin crisis of 2011 took place under similar circumstances. Affected companies were closed, and recall actions were initiated. Media pressure was enormous, and consumers were requested to either return or destroy food, primarily eggs and poultry. Thanks to KAT and the mandatory producer code printed on each egg [16], the eggs origins could be traced. The names of the affected companies—publicly traceable through the code—were disclosed by authorities with an accompanying warning. However, the eggs already reached consumers' refrigerators, as the dioxin was discovered in November, but the authorities did not inform consumers of dioxin residue hazards until January 2012. At this point, most eggs were already consumed. Similar recall actions were initiated for poultry; however, this proved to be significantly more difficult as poultry was not distributed using the same traceability system as the KAT individual egg labelling system. This led to immense reputation damage, as well as more critical consumer attitudes, and in turn reduced egg consumption. Interestingly, the organic food industry benefited from this, as consumers expected that the organic industry adhered to stronger regulations and was subject to more stringent controls, improving safety.

At the end of 2014, the organic food industry was rattled by several events. Residues of a corrosive agent and a fungal toxin were discovered, and the products of numerous companies were stripped of the right to be sold with an organic seal as a result. The contaminated feed, still labelled as 'organic' by a Dutch distributor, had been distributed to organic farmers in Germany.

A total of 2000 tonnes of affected feed, sunflower cake, was distributed by a Dutch distributor as organic feed. Organically producing laying hen companies, as well as pig, cattle and sheep farmers, were affected.

There are no special restrictions for pesticide in place in conventional farming, quite different from organic production, which uses stricter standards. The affected companies faced grave consequences. Goods that had already been delivered were recalled by regional authorities, and goods that were being produced currently could not be distributed for a certain period. It is interesting to note that these regulations were only implemented in individual German states, while the remaining lion's share of cakes contaminated with pesticides could still be processed for organic production in other EU countries. There was no health hazard, but rather a component in the feed that is not permitted in organic production.

Regional German authorities, in the meantime, considered this circumstance consumer deception following the EU Regulation on Organic Farming [17], as this stipulates that only uncontaminated organic feed can be used.

The most recent incident took place in the Netherlands in 2017, where the banned insecticide (against mites) Fipronil was used. Again, contaminated eggs reached the market—almost exclusively eggs produced in the Netherlands—which resulted in a recall for eggs with the NL (the Netherlands) identification. Egg products were also affected, as were processed products such as cakes, noodles and other products containing egg. Here too, the individual egg identification system proved very effective, with targeted recall measures, allowing for the continued distribution of uncontaminated goods. However, processed products remained in a grey area.

9. Preventative measures

Crisis situations can occur suddenly and unexpectedly, even in a carefully managed company. Internal business process problems as well as external, unforeseen difficulties might be the cause. Therefore, a preventative strategy should consider all potential measures that might equip a company to deal with such situations.

This includes general preventative measures (quality measures, self-controlling systems following the HACCP concept principles, traceability, claims and complaints, false management, and the like). Additionally, specific measures should be considered such as the development of a crisis plan and special measures for at-risk products.

Therefore, any properly managed company requires a quality management book, in which the procedural instructions regarding quality politics, as well as the principles of quality assurance, are defined. By now, also in the light of increasing pressure of retailers, systems following the International Feature Standard (IFS) have established themselves. This includes the British Retail Consortium (BRC) [18] and Global Standard for Food Safety, with similar regulations.

A vital component of a quality management system is the aforementioned HACCP concept, which is required following Art. 5 of the Regulation 852/2002 (EC) No. 852/2004 on Food Hygiene. This regulation prescribes that food business operators must develop, implement and maintain one or more procedures based on the HACCP principles.

10. Summary

Food safety is a very complex topic. Crises have repeatedly led to product recalls in the past and significantly contributed to consumer unrest. This not only influenced consumption, which collapsed in part, but also resulted in significant damage to the reputation of the product itself. The examples mentioned from the egg, poultry and game industries illustrate this very clearly. Minor triggers have shown time, and again that a critical light was cast on many food products, also clean food products. Dioxins on forbidden ingredients can be

considered criminal. Environmental residues or soil contaminations, on the other hand, are difficult to assess for producers and pose a risk that is hard to perceive. Oftentimes, these findings are caused by so-called inherited contaminations, as can be seen in the organic egg industry during the Nitrofuran crisis. Producers cannot be held accountable for this; however, they do bear the full risk and consequences associated with this. Unfortunately, it has shown repeatedly in the past that economic factors alone led to crises. The initial use of cheap additives and other ingredients, which did not appear to contain contaminations but did in the end, have contributed to this. Therefore, the food producer should be aware of the responsibilities associated to these activities. However, it can certainly be recommended to inspect purchased feed and similar products before use. Suppliers should have a certain certification. Product recalls by authorities and public disclosure, as well as rapid alert systems (EC), are further sensible measures. However, prevention is better than cure, and high-quality production, as well as adherence to stringent standards, is paramount.

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Author details

Caspar Diederich von der Crone

Address all correspondence to: info@cvdc.de

Doctoral School of Alexandre Lamfalussy, Faculty of Economics, University of Sopron, Sopron, Hungary

References

[1] RAPEX, website: https://ec.europa.eu/food/safety/rasff_en

[2] von der Crone, Managing Director KAT. Verein für kontrollierte alternative. Germany: Tierhaltungsformen e.V. http://www.kat.ec

[3] EUR-LEX, website: http://eur-lex.europa.eu/legal-content/DE/TXT/?uri=celex:32002R0178

[4] JURIS, website: https://www.gesetze-im-internet.de/lfgb/BJNR261810005.html

[5] Quote from the Food Law Risk Assessment Manual

[6] KAT egg production requirements, website: http://KAT.ec

[7] Standards QS GmbH, website: https://www.q-s.de

[8] IFS certification, website: https://www.ifs-certification.com/index.php/de/

[9] Administration regulations, website: http://www.verwaltungsvorschriften-im-internet.de/bsvwvbund_09112009_329225270006.htm

[10] Food Commodities, excerpt "Handbuch der Risikobewertung" KWG Rechtsanwälte, Alexander Pitzer, website: http://kwg.eu

[11] Bleifreie Geschosse website: https://www.bmel.de/DE/Wald-Fischerei/04_Jagd/_texte/BleifreieJagdgeschosse.html

[12] Research project lead website: http://www.bfr.bund.de/de/forschungsprojekt_lebensmittelsicherheit_von_jagdlich_gewonnenem_wildbret-129597.html

[13] Lead residuals in venison, website EPEGA, http://www.epega.org, internal members area

[14] EUR-LEX, website http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:338:0001:0026:DE:PDF

[15] Venison guidelines EPEGA, website http://www.epega.org, internal members area

[16] Egg identification, website http://www.was-steht-auf-dem-Ei.de

[17] EUO-LEX, websitehttp://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:189:0001:0023:DE

[18] BRC Standard, website, https://www.brcglobalstandards.com/brc-global-standards/food-safety/

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